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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,721	10/22/2003	Kazunori Ban	392.1830	3973

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EXAMINER

LIEW, ALEX KOK SOON

ART UNIT

PAPER NUMBER

2624

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/06/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/689,721	BAN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Alex Liew	2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 – 4 and 8 – 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasi (US pub no 2004/0005092) in view of Ishiyama (US pub no 2002/0097906).

With regards to claim 2, Tomasi discloses a three-dimensional visual sensor, which performs three-dimensional measurement of an object comprising

two-dimensional information acquiring means (see fig 1 - camera),

three-dimensional information acquiring means, wherein three dimensional information acquiring means receives the reflected light of the light projected by projecting means onto said object by means of the light receiving means to acquire three-dimensional information on the inclination of the surface on which said measuring point of said object exist and / or distance from said camera to the surface (see fig 1 – the projector, 110, projects light patterns on the object, 105, the system obtains depth information of the element points projected onto the object, depth information are three dimensional information – fig 12 shows the inclination of the object using the element points projected on the object, for example when approaching the eye area the element

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points are inclined indicating the following elements are deeper than the current ones) and

combining means combines the information acquired by two-dimensional information acquiring means and the information acquired by said three-dimensional information of said camera and generates new calibration information of said camera and generates new three-dimensional information (see fig 1 – the projector provide element points onto the object to provide three dimensional information and camera system provide two dimensional information, calibration is done before projection of the element points and imaging of the imaging system, paragraph 33).

But Tomasi's two-dimensional information obtaining system does not disclose comparing a reference image including a characteristic area of the object with the image taken of the object. However, Ishiyama discloses two-dimensional information acquiring means determines the position of a measuring point of said object on a two-dimensional image (see fig 9 – point P is the measuring point), compares a reference image including a characteristic area of the object with the image of said characteristic area in said two-dimensional image (see fig 10 – 240 and paragraph 122 and 123 – the imaged object is compared with an image of a similar in the database of image objects) and determines parameter values that describe a transformation expressing geometrical deformation with respect to said reference image provided by mapping using said camera (see equation 5 –  $I_C$  shows the similarity between the input image and registered image,  $I_C$  is a vector so it has more than one value, B is the texture of the object which has relation with b also related to the surface of the object).

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One skill in the art would compare a reference image including a characteristic area of the object with the image taken of the object because get an idea of what the area of the imaged object's shape is like, so the system can use the registered object as a starting point to obtaining the shape of the object, shorting the time needed to obtain three dimensional information.

With regards to claim 3, Tomasi discloses a three-dimensional visual sensor according to claim 2, wherein said light is received at the same camera position as the camera position at which said two-dimensional image is captured (see fig 1 – the camera captures both the image of the object and image of the light projected onto the object).

With regards to claim 4, Tomasi discloses a three-dimensional visual sensor according to claim 2, wherein said camera also serves as said light receiving means (see fig 1 – the camera captures both the image of the object and image of the light projected onto the object).

With regards to claim 8, Tomasi discloses all of the claim elements / features as discussed above in rejection for claim 2 and incorporated herein by reference, but fails to disclose a straight line which passes through the measuring point and intersection between surface and straight line. Ishiyama discloses means for determining, in the three-dimensional space, a straight line which passes through the measuring point on said object and a specific point on said camera (see fig 9 – line from point P to point Q)

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and means for determining, based on information on said straight line and the surface on which the measuring point on said object exist, an intersection between said surface and said straight line (see fig 9 – point P is where the straight line and surface meets).

One skill in the art would desire to determine a straight line passing through a measuring point because to obtain a correspondence point with respect to the viewer and imager to measure the depth of the measuring point, so other three dimensional points can also be obtain easily, since the system contains reference images of the object.

With regards to claim 9, see the rationale and rejection for claim 2.

With regards to claim 10, see the rationale and rejection for claim 3.

With regards to claim 11, see the rationale and rejection for claim 4.

With regards to claim 1, see the rationale and rejection for claims 2 and 8.

3. Claims 5 – 7 and 12 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasi ('092) in view of Ishiyama ('906) as applied to claim 2 further in view of Higuchi (US pat no 5,129,010).

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With regards to claim 5, Tomasi and Ishiyama disclose all of the claim elements / features as discussed above in rejection for claim 2 and incorporated herein by reference which includes transforming means (disclosed by Ishiyama, equation 5) and combining means (disclosed by Tomasi, fig 1), but fails to disclose camera mounted on a robot to obtain two and three dimensional information. Higuchi discloses camera is mounted in a robot and captures said two-dimensional information and three-dimensional information at the same robot position (see fig 1 and col. 8 lines 45 – 53). One skill in the art would include a camera mounted on a robot because user / operator is able to program positional information into the robot, so the user does not have to manually operate it, saving labor cost.

With regards to claim 6, an extension of claim 5, Higuchi further discloses positional information of said robot (see col. 8 lines 45 – 54).

With regards to claim 7, Tomasi discloses transforming means as discussed in claim 2.

With regards to claim 12, see the rationale and rejection for claim 5.

With regards to claim 13, see the rationale and rejection for claim 6.

With regards to claim 14, see the rationale and rejection for claim 7.

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3. Claims 15 / 2, 15 / 9, 16 / 2 and 16 / 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasi ('092) in view of Ishiyama ('906) as applied to claim 2 further in view of Kinoshita (US pat no 6,137,902).

With regards to claim 15 / 2, Tomasi discloses all of the claim elements / features as discussed above in rejection for claim 2 and incorporated herein by reference, but fails to disclose using Affine transform. Kinoshita discloses a visual sensor according to claim 2, wherein said transformation is an affine transformation (see fig 5). One skill in the art would use Affine transform because affine transforms provides linear relation, improving three-dimensional information estimation (see Kinoshita col. 1 lines 35 – 40) such as the orientation and position of the camera.

With regards to claims 15 / 9, 16 / 2 and 16 / 9, see the rationale and rejection for claim 15 / 2. In addition, affine transform obtain perspective model of the camera.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex Liew whose telephone number is (571)272-8623.

The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571)272-7695. The fax phone



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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**Alex Liew**  
**AU2624**  
**2/25/07**



JOSEPH MANCUSO  
SUPERVISORY PATENT EXAMINER